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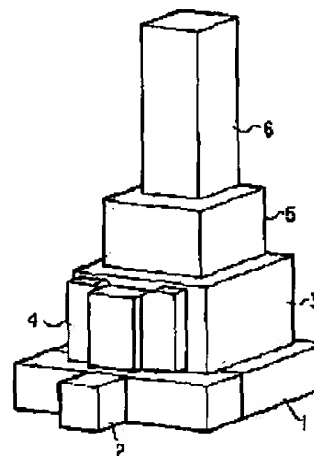
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(54) SURFACE-PROTECTIVE GRAVE STONE AND SURFACE PROTECTION METHOD OF GRAVE STONE

(57)Abstract:

PROBLEM TO BE SOLVED: To retain the beautiful surface of a grave stone which are not stained with ease and which are not chemically eroded, for a long time, by covering the whole surface with a protective skin having siloxane bonds.

SOLUTION: The surface of a lower base stone 1, an incense burner 2, a middle base stone 3, a water bowl 4, an upper base stone 5, and a tombstone 6 constituting grave stones, is sufficiently washed and dried. Subsequently, a surface-protective agent chiefly made of a siloxane condensation product is applied by a spray gun or the like on the whole face including the bottom face of the constituting members 1-6 to form a surface protection skin film after curing at the normal temperature. Since the protection skin film coating the surface of grave stones contains siloxane bonds in the molecular structure, it is chemically inert and hence, excellent in anticorrosiveness, water-repellent effect, and water-imperviousness. As a result, it prevents oxidizing chemical substances in rainwater from eroding the surface of the grave stones. Even if they are stained, the stains can be easily removed by washing. Accordingly, the surface of the grave stones can be beautifully retained for a long time.



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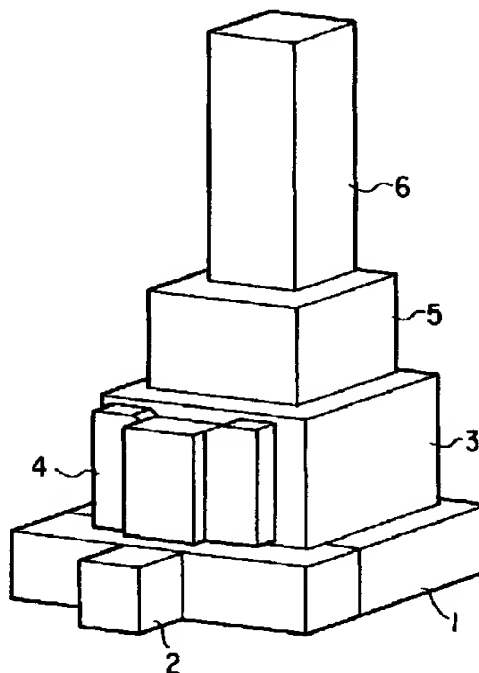
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(54) 【発明の名称】 表面保護墓石および墓石の表面保護方法

(57) 【要約】

【課題】 汚れが付着し難く、かつ化学的にも浸蝕され難い美しい表面状態を長期間に亘って維持することが可能な表面保護墓石を提供する。

【解決手段】 墓石の表面全体にシロキサン結合を有する保護皮膜を被覆してなることを特徴とする。



【特許請求の範囲】

【請求項1】 墓石の表面全体にシロキサン結合を有する保護皮膜を被覆してなることを特徴とする表面保護墓石。

【請求項2】 墓石の彫刻文字部分を粘土質の詰め物で埋め込んだ後、シロキサン縮合物を主成分とする表面保護剤を塗布し、硬化して硬化皮膜を形成する工程と、前記詰め物を除去した後、露出した彫刻文字部分にアルコキシシランまたはその加水分解物とコロイダルシリカを含む文字保護剤を塗布し、硬化して艶消し皮膜を形成する工程とを具備したことを特徴とする墓石の表面保護方法。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、表面保護墓石および墓石の表面保護方法に関する。

【0002】

【従来の技術】一般に、墓石は外的要因と内的要因とによって汚れを生じる。外的要因による汚れは、土埃または雨による地面からの跳ね上げや表面を伝う汚れを含む雨跡、落ち葉等による汚れ成分の付着、或いは雨水中の酸性化学物質による表面の化学的浸蝕によって生じる。特に、墓石の表面には微小な穴や凹凸が存在し、ここに土埃などの汚れが付着すると、雨水のような落下水は前記墓石表面に付着した汚れを拡散し、その汚れた水が表面に付着残留しながら落下して汚れを生じる。また、表面を伝った雨水に、酸性化学物質や地面からの跳ね上げ、落ち葉等による汚れ成分が含まれていると、それらの汚れが前記墓石表面の微小な穴や凹凸に蓄積される。

【0003】また、内的要因による汚れは墓石自体に含まれる鉄分が外部から浸透した酸性水分により酸化されて表面にしみ状に浮きでることにより生じる。このような汚れは、簡単な清掃では除去できないため、墓石の外観性を著しく損なう。

【0004】

【発明が解決しようとする課題】本発明は、汚れが付着し難く、かつ化学的にも浸蝕され難い美麗な表面状態を長期間に亘って維持することが可能な表面保護墓石を提供しようとするものである。

【0005】また、本発明は汚れが付着し難く、かつ化学的にも浸蝕され難い美麗な表面状態を長期間に亘って維持することが可能で、さらに彫刻文字部分を自然な風合いを保ちながら外界から保護することが可能な墓石の表面保護方法を提供しようとするものである。

【0006】

【課題を解決するための手段】本発明に係わる表面保護墓石は、墓石の表面全体にシロキサン結合を有する保護皮膜を被覆してなることを特徴とするものである。本発明に係わる墓石の表面保護方法は、墓石の彫刻文字部分を粘土質の詰め物で埋め込んだ後、シロキサン縮合物を

主成分とする表面保護剤を塗布し、硬化して硬化皮膜を形成する工程と、前記詰め物を除去した後、露出した彫刻文字部分にアルコキシシランまたはその加水分解物とコロイダルシリカを含む文字保護剤を塗布し、硬化して艶消し皮膜を形成する工程とを具備することを特徴とするものである。

【0007】

【発明の実施の形態】以下、本発明を図面を参照して詳細に説明する。図1は、墓石を示す斜視図である。下台石1は、骨壺が収納されるカロート（図示せず）の上に設置される。香炉2は、前記下台石1の前面に配置される。中台石3は、前記下台石1上に載置され、かつ水鉢4は前記中台石3の前面に位置するように前記下台石1上に載置されている。上台石5は、前記中台石3上に載置され、さらに棹石6は前記上台石5上に載置されている。なお、前記棹石6の前面には家名などの彫刻文字（図示せず）が付されている。

【0008】このような墓石を構築する下台石1、香炉2、中台石3、水鉢4、上台石5および棹石6の底の面を含む全面にはシロキサン結合を有する保護皮膜が被覆されている。

【0009】前記墓石としては、例えば白御影石、黒御影石、小松石、玄武岩の他に大理石、砂岩等が用いられる。次に、本発明の表面保護墓石における表面保護皮膜の施工方法を説明する。

【0010】まず、前述した墓石の構築部材の表面を十分に洗浄し、乾燥する。つづいて、前記構築部材の底面を含む全面にシロキサン縮合物を主成分とする表面保護剤を例えばスプレーガン等を用いて塗布し、常温で硬化させて表面保護皮膜を形成する。

【0011】前記シロキサン縮合物を主成分とする表面保護剤としては、例えば(1)モノメチルシラン、モノエチルシランおよびモノフェニルジクロロシランに少量のジメチルシラン、ジエチルシランおよびジフェニルジクロロシランを加え、水を加えて加水分解して得られた3官能の縮合物($\text{RSiO}_{1.5}$)および2官能の縮合物(R_2SiO)をキシレン等の溶剤で溶解したシリコーンワニス系溶液と酢酸ナトリウム、オクチル酸亜鉛、テトラブチルチタネート、アルミニウムアセチルアセトネートなどの硬化促進剤とを含む組成のもの；(2)前記縮合物にアルキド樹脂、エポキシ樹脂、アクリル樹脂、ウレタン樹脂などの有機樹脂を添加して変性し、これをキシレン等の溶剤で溶解した変性シリコーンワニス系溶液と前述した硬化促進剤とを含む組成のもの、等が用いられる。特に、変性シリコーンワニス系溶液を含む表面保護剤の塗布、硬化により形成された表面保護皮膜は墓石表面により強固に密着できるために有益である。なお、前記硬化促進剤は墓石の構築部材に塗布する直前に前記シリコーンワニス系溶液や変性シリコーンワニス系溶液に加えられる。

【0012】前記表面保護皮膜の施工において、表面保護剤をスプレーガンを用いて塗布する場合はその塗布に先立って彫刻文字部分に表面保護剤を刷毛塗りすることが好ましい。

【0013】以上説明した本発明に係わる表面保護墓石は、墓石表面に被覆される保護皮膜が分子構造がガラスや石英と同様なシロキサン結合($\text{Si}-\text{O}-\text{Si}$)を有するため、化学的に不活性でpH2程度の酸に対する優れた耐食性、優れた親水効果および耐透水性を示す。その結果、前記保護皮膜で被覆された墓石は雨水中の酸性化学物質により表面が浸蝕されるのを防止できる。また、前記保護皮膜は高い親水性を有するために土埃または雨による地面からの跳ね上げや表面を伝う汚れを含む雨跡、落ち葉等による汚れ成分が付着しても水洗い等により前記付着物を簡単に除去することができる。さらに、前記保護皮膜は優れた耐酸性と耐透水性を有するため、前記墓石自体に鉄分等が含まれていても、酸性水分が表面から墓石内部に浸透するのを阻止できるため、前記鉄分の酸化に伴うしみ状の汚れ発生を防止できる。さらに、前記保護皮膜は優れた耐候性を示す。

【0014】したがって、外的、内的要因による汚れを防止して長期間に亘って墓石表面を美麗な状態を維持することが可能な表面保護墓石を提供できる。また、前述した優れた特性を有する表面保護皮膜を墓石に被覆することにより従来では耐食性等の点から墓石として不向きであった大理石、砂岩も使用することが可能になる。

【0015】次に、本発明に係わる墓石の表面保護方法を説明する。

(第1工程)まず、墓石(棹石等)の彫刻文字部分を粘土質の詰め物で埋め込んだ後、前記棹石を含む墓石の構築部材の底面を含む全面に前述したシロキサン縮合物を主成分とする表面保護剤を例えばスプレーガンを用いて塗布し、硬化して硬化皮膜(表面保護皮膜)を形成する。

【0016】前記墓石としては、例えば白御影石、黒御影石、小松石、玄武岩の他に大理石、砂岩等が用いられる。特に、光沢が付与されると彫刻文字が読み難くなる色の濃い石(例えば黒御影石)からなる墓石を対象にすることが好ましい。

【0017】前記粘土質の詰め物としては、剥離性が良好な油粘土が好ましい。

(第2工程)次いで、前記彫刻文字部分の詰め物を除去した後、前記彫刻文字部分にアルコキシシランまたはその加水分解物とコロイダルシリカとを含む文字保護剤を刷毛塗り等により塗布し、硬化して艶消し皮膜を形成する。

【0018】前記文字保護剤としては、例えば(a)一般式 $\text{R}^1\text{Si}(\text{OR}^2)_3$ (ただし、式中の R^1 はメチル基、エチル基、n-プロピル基などのアルキル基、 γ -クロロプロピル基、ビニル基、3,3,3-トリクロロ

プロピル基、 γ -グリシドキシプロピル基、 γ -メタクリルオキシプロピル基、 γ -メルカプトプロピル基、フェニル基、3,4-エポキシシクロヘキシルエチル基、 γ -アミノプロピル基、 R^2 はメチル基、エチル基、n-プロピル基、i-プロピル基、n-ブチル基、sec-ブチル基、t-ブチル基、アセチル基などのアシル基を示す)にて表されるオルガノアルコキシシランもしくはその加水分解物、または一般式 $\text{Si}(\text{OR}^3)_4$ (ただし、式中の R^3 はメチル基、エチル基、n-プロピル基などのアルキル基を示す)にて表されるテトラアルコキシシランもしくはその加水分解物と、(b)コロイダルシリカとをイソプロピルアルコール等の溶剤に溶解分散させ、この溶液にジルコニウムテトラアルコキシドまたはトリアルコキシドボロン等の硬化促進剤を添加した組成を有する。なお、前記硬化促進剤は墓石の構築部材の彫刻文字部分に塗布する直前に前記(a)および(b)成分を含む溶液に加えられる。

【0019】以上説明した本発明に係わる墓石の表面保護方法によれば、墓石の彫刻文字部分を予め粘土質の詰め物で埋め、シロキサン縮合物を主成分とする表面保護剤を塗布し、硬化することによって、前述した分子構造がガラスや石英と同様なシロキサン結合($\text{Si}-\text{O}-\text{Si}$)を有する化学的に不活性でpH2程度の酸に対する優れた耐食性、優れた親水効果および耐透水性を示す硬化皮膜(表面保護皮膜)を強固に形成することができる。その結果、外的、内的要因による汚れを防止して長期間に亘って墓石表面を美麗な状態を維持することができる。

【0020】また、前記硬化膜の形成後、前記彫刻文字部分に埋設した粘土質の詰め物を剥離、除去して彫刻文字部分を露出させる。この際、前記硬化膜(表面保護皮膜)は前記墓石構築部材に対して強固に付着されているため、前記詰め物周囲の保護皮膜をも剥離を生じることなく詰め物のみを除去できる。特に、油粘土からなる詰め物は彫刻文字部分から容易に剥離、除去することが可能になる。このように露出された彫刻文字部分にアルコキシシランまたはその加水分解物とコロイダルシリカとを含む文字保護剤を塗布し、硬化することによって艶消し皮膜を形成することができる。形成された艶消し皮膜は、前記彫刻文字部分を外界から保護することができると共に、光沢性に乏しいために彫刻文字が反射せず、その文字を明瞭に読み取ることができる。

【0021】したがって、汚れが付着し難く、かつ化学的にも浸蝕され難い美麗な表面状態を長期間に亘って維持することが可能で、さらに黒御影石のような色の濃い石の墓石でも彫刻文字部分を読取りし易い自然な風合いを保ちながら外界から保護することが可能な墓石の表面保護方法を提供することができる。

【0022】

【実施例】以下、本発明の好ましい実施例を詳細に説明

する。

【実施例1】まず、モノメチルシラン、モノエチルシランおよびモノフェニルジクロロシランに少量のジメチルシラン、ジエチルシランおよびジフェニルジクロロシランを加え、水を加えて加水分解して得られた3官能および2官能の縮合物をキシレンで溶解し、この溶液にアクリル樹脂を添加することにより硬化促進剤未添加の変性シリコンワニス系溶液を調製した。

【0023】次いで、白御影石からなる前述した図1に示す下台石1、香炉2、中台石3、水鉢4、上台石5および棹石6（墓石構築部材）からなる墓石のうち棹石6のみを取り出し、その底面を含む全面を洗浄した後、乾燥した。つづいて、前記硬化促進剤未添加の変性シリコンワニス系溶液に硬化促進剤であるテトラブチルチタネートを5重量%添加して表面保護剤を調製し、この表面保護剤を前記棹石6の彫刻文字部分に刷毛塗りにより塗布し、硬化させて前記彫刻文字部分に表面保護皮膜を形成した。ひきつづき、前記棹石6の底面を含む全面に前述した表面保護剤をスプレーガンを用いて塗布し、硬化させることにより表面保護皮膜を形成した。

【0024】以上のような実施例1の表面保護皮膜が被覆された白御影石からなる棹石6および表面保護が施されていない白御影石からなる棹石（比較例1）をそれぞれ8か月間に亘って外界に曝した後、それら棹石の表面状態を観察した。その結果、実施例1の棹石6は白御影石本来の色調が保持されるのに対し、比較例1の棹石は酸および土埃を含む雨水の浸透や表面付着により白御影石本来のきめ細かな色調が失われ、大まかな斑模様になった。

【0025】なお、棹石に用いた白御影石は彫刻部分に表面保護皮膜が被覆されて光沢性が付与されても、その材質および色から彫刻文字が読み難くなることはなかった。

【実施例2】まず、テトラエチルアルコキシシランとコロイダルシリカをイソプロピルアルコールに溶解分散させて硬化促進剤未添加のアルコキシシラン系溶液を調製した。

【0026】次いで、黒御影石からなる前述した図1に示す下台石1、香炉2、中台石3、水鉢4、上台石5および棹石6（墓石構築部材）からなる墓石のうち棹石6のみを取り出し、その底面を含む全面を洗浄した後、乾燥した。つづいて、前記棹石6の彫刻文字部分を油粘土で埋め込んだ。ひきつづき、前述した実施例1と同様な硬化促進剤未添加の変性シリコンワニス系溶液に硬化促進剤であるテトラブチルチタネートを5重量%添加して表面保護剤を調製し、この表面保護剤をスプレーガンを用いて前記棹石6の底面および彫刻文字部分を含む全面に塗布し、硬化させることにより表面保護皮膜を形成した。

【0027】次いで、前記表面保護皮膜が十分に硬化し

た後、前記棹石6の彫刻文字部分の油粘土をカット等により除去した。つづいて、前記硬化促進剤未添加のアルコキシシラン系溶液にジルコニウムテトラエチルアルコキシドを3重量%添加して文字保護剤を調製し、この文字保護剤を露出した彫刻文字部分に刷毛で塗布し、硬化させることにより艶消し皮膜を彫刻文字部分に形成した。

【0028】以上のような実施例2の表面保護皮膜および艶消し皮膜が被覆された黒御影石からなる棹石6および表面保護が施されていない黒御影石からなる棹石（比較例2）をそれぞれ8か月間に亘って外界に曝した後、それら棹石の表面状態を観察した。その結果、実施例2の棹石は黒御影石特有の光沢性が保持されるのに対し、比較例2の棹石は光沢性が失われて白っぽい色に変色した。

【0029】さらに、実施例2の黒御影石からなる棹石は家名等の彫刻文字部分を艶消し皮膜で保護されているため、その彫刻文字部分が反射せず、読取りし易い自然な風合いを有していた。

20 【0030】（実施例3）まず、建墓後28年間経過した小松石からなる前述した図1に示す下台石1、香炉2、中台石3、水鉢4、上台石5および棹石6（墓石構築部材）の底面を含む全面を洗浄した後、乾燥した。つづいて、前述した実施例1と同様な硬化促進剤未添加の変性シリコンワニス系溶液に硬化促進剤であるテトラブチルチタネートを5重量%添加して表面保護剤を調製し、この表面保護剤を前記墓石構築部材の彫刻文字部分に刷毛塗りにより塗布し、硬化させて前記彫刻文字部分に表面保護皮膜を形成した。ひきつづき、前記墓石構築部材の底面を含む全面に前述した表面保護剤をスプレーガンを用いて塗布し、硬化させることにより表面保護皮膜を形成した。このような表面保護皮膜が形成された墓石構築部材を前述した図1に示すように組み立てることにより表面保護墓石を構築した。

【0031】以上のような実施例3の表面保護皮膜が被覆された小松石からなる墓石を1年間に亘って外界に曝した後、その墓石の表面状態を観察した。その結果、実施例3の墓石は小松石本来の緑色が保持されることを確認した。

40 【0032】なお、墓石構築部材に用いた小松石は彫刻部分に表面保護皮膜が被覆されて光沢性が付与されても、その材質および色から彫刻文字が読み難くなることはなかった。

【0033】（実施例4）まず、建墓後25年間経過した黒御影石からなる前述した図1に示す下台石1、香炉2、中台石3、水鉢4、上台石5および棹石6（墓石構築部材）の底面を含む全面を洗浄した後、乾燥した。つづいて、前記墓石構築部材の彫刻文字部分を油粘土で埋め込んだ。ひきつづき、前述した実施例1と同様な硬化促進剤未添加の変性シリコンワニス系溶液に硬化促進

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剤であるテトラブチルチタネートを5重量%添加して表面保護剤を調製し、この表面保護剤をスプレーガンを用いて前記墓石構築部材の底面および彫刻文字部分を含む全面に塗布し、硬化させることにより表面保護皮膜を形成した。

【0034】次いで、前記表面保護皮膜が十分に硬化した後、前記墓石構築部材の彫刻文字部分の油粘土をカット等により除去した。つづいて、前述した実施例2と同様な硬化促進剤未添加のアルコキシシラン系溶液にジレコニウムテトラエチルアルコキシドを3重量%添加して文字保護剤を調製し、この文字保護剤を露出した彫刻文字部分に刷毛で塗布し、硬化させることにより艶消し皮膜を彫刻文字部分に形成した。このような表面保護皮膜および艶消し皮膜が形成された墓石構築部材を前述した図1に示すように組み立てることにより表面保護墓石を構築した。

【0035】以上のような実施例4の表面保護皮膜および艶消し皮膜が被覆された黒御影石からなる墓石を1年間に亘って外界に曝した後、墓石の表面状態を観察した。その結果、実施例4の墓石は黒御影石特有の光沢性が保持されることを確認した。

【0036】(実施例5) まず、2枚の大理石板の底面を含む全面を洗浄した後、乾燥した。つづいて、前述した実施例1と同様な硬化促進剤未添加の変性シリコンワニス系溶液に硬化促進剤であるテトラブチルチタネートを5重量%添加して表面保護剤を調製し、この表面保護剤を前記大理石板の底面を含む全面にスプレーガンを用いて塗布し、硬化させることにより表面保護皮膜を形成した。

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【0037】以上のような実施例5の表面保護皮膜が被覆された2枚の大理石板のうち、一方の大理石板に対し、JIS K5400(1990)塗料一般試験方法における9.8促進耐候性の9.8.1サンシャインアーケ灯式により200時間の促進耐候試験を実施し、試験未実施の残りの表面保護皮膜が被覆された大理石板と目視により外観を比較した。その結果、促進耐候試験後の大理石板と試験未実施の大理石板の間には外観上、差異が認められなかった。

10 【0038】

【発明の効果】以上詳述したように、本発明によれば雨水や落ち葉等の外的要因、墓石自体に含まれる鉄分の酸化等の内的要因による汚れを防止して長期間に亘って墓石表面を美麗な状態を維持することが可能な表面保護墓石を提供することができる。

【0039】また、本発明によれば汚れが付着し難く、かつ化学的にも浸蝕され難い美麗な表面状態を長期間に亘って維持することが可能で、さらに黒御影石のような色の濃い石の墓石でも彫刻文字部分を読取りし易い自然な風合いを保ちながら外界から保護することが可能な墓石の表面保護方法を提供することができる。

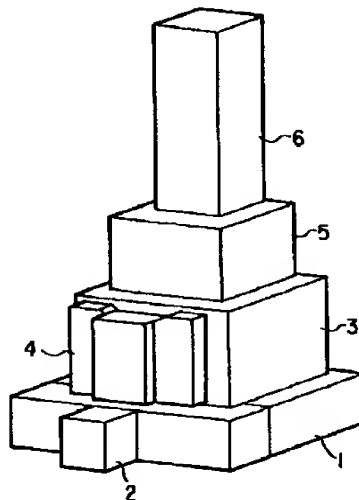
【図面の簡単な説明】

【図1】本発明に係わる墓石を示す斜視図。

【符号の説明】

- 1…下台石、
- 2…香炉、
- 4…水鉢、
- 6…棹石。

【図1】



フロントページの続き

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the surface-protection method of a surface-protection gravestone and a gravestone.

[0002]

[Description of the Prior Art] Generally, a gravestone produces dirt according to an external factor and an inner factor. The dirt by the external factor is produced by chemical erosion of the front face by adhesion of the dirt component by ****, fallen leaves, etc. containing the dirt which is transmitted to splashes raising and the front face from the ground by the dust of earth or rain, or the acid chemical in storm sewage. If a minute hole and minute irregularity exist on the surface of a gravestone and dirt, such as the dust of earth, adheres here especially, fall water like storm sewage diffuses the dirt adhering to the aforementioned gravestone front face, while the polluted water carries out adhesion remains on a front face, it will fall, and will produce dirt. Moreover, if it has bounded on the transmitted storm sewage from an acid chemical or the ground and the dirt component by fallen leaves etc. includes the front face, those dirt will be accumulated at the minute hole and minute irregularity on the aforementioned front face of a gravestone.

[0003] Moreover, the dirt by the inner factor oxidizes with the acid moisture which the iron contained in the gravestone itself permeated from the outside, and is produced by floating in a front face in the shape of a stain, and coming out to it. In easy cleaning, since such dirt is unremovable, it spoils the appearance nature of a gravestone remarkably.

[0004]

[Problem(s) to be Solved by the Invention] this invention tends to offer the surface-protection gravestone which it continues and can maintain the beautiful surface state which is hard to be eroded also chemically at a long period of time that dirt cannot adhere easily.

[0005] Moreover, it is going to offer the surface-protection method of still the gravestone [that dirt cannot adhere easily, it continues, and this invention can maintain the beautiful surface state which is hard to be eroded also chemically at a long period of time, and] that can protect a sculpture character portion from the external world, maintaining natural feeling.

[0006]

[Means for Solving the Problem] The surface-protection gravestone concerning this invention covers the protective film which has siloxane combination on the surface of [whole] a gravestone, and is characterized by the bird clapper. The process which the surface-protection method of the gravestone concerning this invention applies and hardens the surface-protection agent which makes a siloxane condensate a principal component after embedding the sculpture character portion of a gravestone by argillaceous padding, and forms a hardening coat. After removing the aforementioned padding, it is characterized by providing the process which applies and hardens the character protective agent which contains alkoxysilane, or its hydrolyzate and colloidal silica in the exposed sculpture character portion, and forms a lusterless coat.

[0007]

[Embodiments of the Invention] Hereafter, this invention is explained in detail with reference to a drawing. Drawing 1 is the perspective diagram showing a gravestone. Lower **** 1 is installed on KAROTO (not shown) by which a cinerary urn is contained. A incense burner 2 is arranged in the front face of bottom **** 1 of the above. The China-Taiwan stone 3 is laid on bottom **** 1 of the above, and the saucer 4 is laid on bottom **** 1 of the above so that it may be located in the front face of the aforementioned China-Taiwan stone 3. Upper **** 5 is laid on the aforementioned China-Taiwan stone 3, and **** 6 is further laid on above top **** 5. In addition, sculpture characters (not shown), such as a house name, are given to the front face of aforementioned **** 6.

[0008] The protective film which has siloxane combination all over including the field of the bottom of lower **** 1 which builds such a gravestone, a incense burner 2, the China-Taiwan stone 3, a saucer 4, upper **** 5, and **** 6 is covered.

[0009] As the aforementioned gravestone, a marble, a sandstone, etc. are used, for example other than white granite, black granite, smallness Matsuishi, and a basalt. Next, the construction method of the surface-protection coat in the surface-protection gravestone of this invention is explained.

[0010] first, construction of the gravestone mentioned above -- the front face of a member is fully washed and it dries continuing -- the aforementioned construction -- apply the surface-protection agent which makes a siloxane condensate a principal component all over including the base of a member using a spray gun etc., it is made to harden in ordinary

temperature, and a surface-protection coat is formed

[0011] As a surface-protection agent which makes the aforementioned siloxane condensate a principal component For example, (1) A monomethyl silane, a monoethyl silane, and a small amount of dimethylsilane to monochrome phenyl dichlorosilane, The silicone varnish system solution which dissolved the condensate (RSiO1.5) of three organic functions which added diethylsilane and diphenyl dichlorosilane, added water, understood an added water part, and were acquired, and the condensate (R2 SiO) of two organic functions with solvents, such as a xylene, and sodium acetate, octylic acid zinc, Thing [of composition containing hardening accelerators, such as tetrabutyl titanate and aluminum acetylacetonate,]; (2) To the aforementioned condensate, alkyd resin, Organic resins, such as an epoxy resin, acrylic resin, and a urethane resin, are added and denaturalized, and the thing of composition containing the denaturation silicone varnish system solution which dissolved this with solvents, such as a xylene, and the hardening promotion material mentioned above etc. is used. Since especially the surface-protection coat formed of the application of the surface-protection agent containing a denaturation silicone varnish system solution and hardening can be firmly stuck by the gravestone front face, it is useful. In addition, the aforementioned hardening accelerator is added to the aforementioned silicone varnish system solution or a denaturation silicone varnish system solution, just before applying to the construction member of a gravestone.

[0012] In construction of the aforementioned surface-protection coat, when applying a surface-protection agent using a spray gun, it is desirable to carry out brush coating of the surface-protection agent to a sculpture character portion in advance of the application.

[0013] Since the protective film covered by the gravestone front face has the siloxane combination (Si-O-Si) as glass or a quartz with the same molecular structure, the surface-protection gravestone concerning this invention explained above shows the outstanding corrosion resistance over about pH two acid, the outstanding water-repellent effect, and water permeability-proof by inactive chemically. Consequently, the gravestone covered with the aforementioned protective film can prevent that a front face is eroded by the acid chemical in storm sewage. Moreover, the aforementioned protective film can remove the aforementioned affix easily by washing in cold water etc., even if the dirt component by ****, fallen leaves, etc. containing the dirt which is transmitted to splashes raising and the front face from the ground by the dust of earth or rain adheres, since it has high water repellence. Furthermore, since acid moisture can prevent permeating the interior of a gravestone from a front face even if iron etc. is contained in the aforementioned gravestone itself, since it has the outstanding acid resistance and the outstanding water permeability-proof, the aforementioned protective film can prevent dirt generating of the shape of a stain accompanying oxidization of the aforementioned iron. Furthermore, the aforementioned protective film shows the outstanding weatherability.

[0014] Therefore, the surface-protection gravestone which the dirt by the external and inner factor is prevented, and it continues at a long period of time, and can maintain a beautiful state for a gravestone front face can be offered. Moreover, by the former, it becomes possible to also use the marble which was unsuitable as a gravestone, and a sandstone from points, such as corrosion resistance, by covering to a gravestone the surface-protection coat which has the outstanding property mentioned above.

[0015] Next, the surface-protection method of the gravestone concerning this invention is explained.

(The 1st process) construction of the gravestone which contains the aforementioned **** first after embedding the sculpture character portion of gravestones (pole stone etc.) by argillaceous padding -- the surface-protection agent which makes a principal component the siloxane condensate mentioned above all over including the base of a member is applied and hardened using a spray gun, and a hardening coat (surface-protection coat) is formed

[0016] As the aforementioned gravestone, a marble, a sandstone, etc. are used, for example other than white granite, black granite, smallness Matsuishi, and a basalt. When gloss is given especially, it is desirable to be aimed at the gravestone which consists of a stone with the deep color which a sculpture character stops being able to read easily (for example, black granite).

[0017] As the aforementioned argillaceous padding, oil clay with good detachability is desirable.

(The 2nd process) Subsequently, after removing padding of the aforementioned sculpture character portion, the character protective agent which contains alkoxysilane, or its hydrolyzate and colloidal silica in the aforementioned sculpture character portion is applied by brush coating etc., is hardened, and a lusterless coat is formed.

[0018] As the aforementioned character protective agent, it is (a), for example. General formula $R_1 Si (OR_2)_3 R_1$ [however,] in a formula -- alkyl groups, such as a methyl group, an ethyl group, and n-propyl group, -- gamma-chloropropyl machine, a vinyl group, 3 and 3, 3-TORIKURO propyl group, gamma-glycidoxy propyl group, gamma-metacryloxy propyl group, gamma-mercapto propyl group, A phenyl group, 3, 4-epoxycyclohexyl ethyl group, gamma-aminopropyl machine, R2 A methyl group, an ethyl group, n-propyl group, i-propyl group, n-butyl, The organoalkoxysilane which shows acyl groups, such as a sec-butyl, t-butyl, and an acetyl group, and is expressed, or its hydrolyzate, Or the tetrapod alkoxysilane expressed with a general formula $(OR_3) Si_4$ (however, R3 in a formula shows alkyl groups, such as a methyl group, an ethyl group, and n-propyl group) or its hydrolyzate, (b) Solvents, such as isopropyl alcohol, are made to carry out dissolution distribution of the colloidal silica, and it has the composition which added hardening accelerators, such as a zirconium tetrapod alkoxide or thoria RUKOKISHIDO boron, in this solution. in addition, the aforementioned hardening accelerator -- construction of a gravestone -- just before applying to the sculpture character portion of a member -- the above (a) And (b) It is added to the solution containing a component.

[0019] By according to the surface-protection method of the gravestone concerning this invention explained above, burying

the sculpture character portion of a gravestone by argillaceous padding beforehand, and applying and hardening the surface-protection agent which makes a siloxane condensate a principal component. The molecular structure mentioned above can form firmly the hardening coat (surface-protection coat) which shows chemically the outstanding corrosion resistance over about pH two acid for which it has the same siloxane combination (Si-O-Si) as glass or a quartz, the outstanding water-repellent effect, and water permeability-proof by inactive. Consequently, the dirt by the external and inner factor can be prevented, it can continue at a long period of time, and a beautiful state can be maintained for a gravestone front face.

[0020] Moreover, after formation of the aforementioned hardening film, it exfoliates, argillaceous padding laid under the aforementioned sculpture character portion is removed, and a sculpture character portion is exposed. Under the present circumstances, since it adheres to the aforementioned hardening film (surface-protection coat) firmly to the aforementioned gravestone construction member, only padding can be removed, without producing exfoliation also for the protective film of the aforementioned circumference of padding. It becomes possible for especially padding that consists of oil clay to exfoliate, and to remove it from a sculpture character portion easily. Thus, a lusterless coat can be formed by applying and hardening the character protective agent which contains alkoxysilane, or its hydrolyzate and colloidal silica in the exposed sculpture character portion. Since it is lacking in glossiness, a sculpture character does not reflect, but the formed lusterless coat can read the character clearly while being able to protect the aforementioned sculpture character portion from the external world.

[0021] Therefore, the surface-protection method of the gravestone [it is possible to continue and to maintain the beautiful surface state which is hard to be eroded also chemically at a long period of time that dirt cannot adhere easily, and] which can be protected from the external world, maintaining the natural feeling to which the gravestone of a stone with a deep color still like black granite also tends to read and carry out a sculpture character portion can be offered.

[0022]

[Example] Hereafter, the desirable example of this invention is explained in detail.

(Example 1) A small amount of dimethylsilane, diethylsilane, and diphenyl dichlorosilane were first added to a monomethyl silane, a monoethyl silane, and monochrome phenyl dichlorosilane, water was added, the condensate of three organic functions which understood an added water part and were acquired, and two organic functions was dissolved by the xylene, and the non-added hardening-accelerator denaturation silicone varnish system solution was prepared by adding acrylic resin in this solution.

[0023] Subsequently, only **** 6 was taken out among the gravestones which consist of lower **** 1 and the incense burner 2 which are shown in drawing 1 which consists of white granite, and which was mentioned above, the China-Taiwan stone 3, a saucer 4, upper **** 5, and **** 6 (gravestone construction member), and it dried, after washing the whole surface including the base. Continued, added the tetrabutyl titanate which is a hardening accelerator 5% of the weight in the hardening-accelerator denaturation silicone varnish system solution which is not added [aforementioned], and prepared the surface-protection agent, and apply this surface-protection agent to the sculpture character portion of aforementioned **** 6 by brush coating, it was made to harden it, and the surface-protection coat was formed in the aforementioned sculpture character portion. It pulled, and it continued and the surface-protection coat was formed by applying and stiffening the surface-protection agent mentioned above all over including the base of aforementioned **** 6 using a spray gun.

[0024] After *(ing) **** (example 1 of comparison) which consists of white granite with which **** 6 and the surface protection which consist of white granite with which the surface-protection coat of the above examples 1 was covered are not given in the external world for eight months, respectively, the surface state of these **** was observed. Consequently, the fine color tone of white granite original was lost by the osmosis and surface adhesion of storm sewage in which **** of the example 1 of comparison contains an acid and the dust of earth to the color tone of white granite original being held in **** 6 of an example 1, and became a rough spots pattern by them.

[0025] In addition, there was no white granite used for **** with a bird clapper that it is hard to read a sculpture character from the quality of the material and a color, even if the surface-protection coat was covered by the sculpture portion and glossiness was given to it.

(Example 2) First, isopropyl alcohol was made to carry out dissolution distribution of tetraethyl alkoxysilane and the colloidal silica, and the non-added hardening-accelerator alkoxysilane system solution was prepared.

[0026] Subsequently, only **** 6 was taken out among the gravestones which consist of lower **** 1 and the incense burner 2 which are shown in drawing 1 which consists of black granite, and which was mentioned above, the China-Taiwan stone 3, a saucer 4, upper **** 5, and **** 6 (gravestone construction member), and it dried, after washing the whole surface including the base. It continued and the sculpture character portion of aforementioned **** 6 was embedded with oil clay. The tetrabutyl titanate which is a hardening accelerator was added 5% of the weight in the hardening-accelerator denaturation silicone varnish system solution which is not added [the / same] as the example 1 which was attracted, and was continued and mentioned above, the surface-protection agent was prepared, and the surface-protection coat was formed by applying this surface-protection agent all over the base and sculpture character portion of aforementioned **** 6 being included using a spray gun, and stiffening it.

[0027] Subsequently, after the aforementioned surface-protection coat fully hardened, the cutter etc. removed the oil clay of the sculpture character portion of aforementioned **** 6. It continued, and the zirconium tetraethyl alkoxide was added 3% of the weight in the hardening-accelerator alkoxysilane system solution which is not added [aforementioned], the character protective agent was prepared, it applied to the sculpture character portion which exposed this character protective agent with the brush, and the lusterless coat was formed in the sculpture character portion by making it harden.

[0028] After ***(ing) ****** (example 2 of comparison) which consists of black granite to which **** 6 and the surface protection which consist of black granite with which the surface-protection coat and lusterless coat of the above examples 2 were covered are not given in the external world for eight months, respectively, the surface state of these **** was observed. Consequently, to glossiness with **** of an example 2 peculiar to black granite being held, glossiness was lost and **** of the example 2 of comparison was colored the whitish color.

[0029] Furthermore, **** which consists of black granite of an example 2 had the natural feeling to which the sculpture character portion does not reflect in, but tends to read and carry out sculpture character portions, such as a house name, since it is protected by the lusterless coat.

[0030] (Example 3) It dried, after washing the whole surface including the base of lower **** 1 and the incense burner 2 which are shown in drawing 1 which consists of smallness Matsuishi who passed for 28 years after **** first, and which was mentioned above, the China-Taiwan stone 3, a saucer 4, upper **** 5, and **** 6 (gravestone construction member). the tetrabutyl titanate which is a hardening accelerator at the hardening-accelerator denaturation silicone varnish system solution which is not added [the / same] as the example 1 continued and mentioned above -- 5 % of the weight -- adding -- a surface-protection agent -- preparing -- this surface-protection agent -- the aforementioned gravestone construction -- it applies to the sculpture character portion of a member by brush coating, it was stiffened, and the surface-protection coat was formed in the aforementioned sculpture character portion pulling -- continuing -- the aforementioned gravestone construction -- the surface-protection coat was formed by applying and stiffening the surface-protection agent mentioned above all over including the base of a member using a spray gun The surface-protection gravestone was built by assembling, as shown in drawing 1 which mentioned above the gravestone construction member in which such a surface-protection coat was formed.

[0031] After ***(ing)** the gravestone which consists of smallness Matsuishi with whom the surface-protection coat of the above examples 3 was covered in the external world for one year, the surface state of the gravestone was observed. Consequently, the gravestone of an example 3 checked that the green of smallness Matsuishi original was held.

[0032] In addition, there was not smallness Matsuishi who used for the gravestone construction member with a bird clapper that it is hard to read a sculpture character from the quality of the material and a color, even if the surface-protection coat was covered by the sculpture portion and glossiness was given to it.

[0033] (Example 4) It dried, after washing the whole surface including the base of lower **** 1 and the incense burner 2 which are shown in drawing 1 which consists of black granite which passed for 25 years after **** first, and which was mentioned above, the China-Taiwan stone 3, a saucer 4, upper **** 5, and **** 6 (gravestone construction member). continuing -- the aforementioned gravestone construction -- the sculpture character portion of a member was embedded with oil clay the tetrabutyl titanate which is a hardening accelerator at the hardening-accelerator denaturation silicone varnish system solution which is not added [the / same] as the example 1 which was attracted, and was continued and mentioned above -- 5 % of the weight -- adding -- a surface-protection agent -- preparing -- this surface-protection agent -- a spray gun -- using -- the aforementioned gravestone construction -- the surface-protection coat was formed by applying all over the base and sculpture character portion of a member being included, and making it harden

[0034] subsequently, the gravestone construction aforementioned after the aforementioned surface-protection coat fully hardens -- the cutter etc. removed the oil clay of the sculpture character portion of a member The zirconium tetraethyl alkoxide was added 3% of the weight in the hardening-accelerator alkoxysilane system solution which is not added [the / same] as the example 2 continued and mentioned above, the character protective agent was prepared, it applied to the sculpture character portion which exposed this character protective agent with the brush, and the lusterless coat was formed in the sculpture character portion by making it harden. The surface-protection gravestone was built by assembling, as shown in drawing 1 which mentioned above the gravestone construction member in which such a surface-protection coat and a lusterless coat were formed.

[0035] After ***(ing)** the gravestone which consists of black granite with which the surface-protection coat and lusterless coat of the above examples 4 were covered in the external world for one year, the surface state of a gravestone was observed. Consequently, the gravestone of an example 4 checked that glossiness peculiar to black granite was held.

[0036] (Example 5) It dried, after washing the whole surface including the base of the marble veneer of two sheets first. The surface-protection coat was formed by using a spray gun, applying and making it harden all over adding the tetrabutyl titanate which is a hardening accelerator 5% of the weight in the hardening-accelerator denaturation silicone varnish system solution which is not added [the / same] as the example 1 continued and mentioned above, preparing a surface-protection agent, and including the base of the aforementioned marble veneer for this surface-protection agent.

[0037] It is JIS to one [among the marble veneers of two sheets with which the surface-protection coat of the above examples 5 was covered] marble veneer. The accelerated weathering test of 200 hours was carried out by the 9.8.1 sunshine arc light formula of the 9.8 accelerated-weathering nature in the K5400 (1990) paint commercial-test method, and the marble veneer and viewing with which the remaining non-carried out examination surface-protection coats were covered compared appearance. Consequently, an exterior and a difference were not accepted between the marble veneer after an accelerated weathering test, and the non-carried out examination marble-veneer capital.

[0038]

[Effect of the Invention] As explained in full detail above, according to this invention, the surface-protection gravestone which the dirt by inner factors, such as oxidization of the iron contained in the external factor of storm sewage, fallen leaves, etc. and the gravestone itself, is prevented, and it continues at a long period of time, and can maintain a beautiful state for a

gravestone front face can be offered.

[0039] Moreover, the surface-protection method of the gravestone [according to this invention, it is possible to continue and to maintain the beautiful surface state which is hard to be eroded also chemically at a long period of time that dirt cannot adhere easily, and] which can be protected from the external world, maintaining the natural feeling to which the gravestone of a stone with a deep color still like black granite also tends to read and carry out a sculpture character portion can be offered.

[Translation done.]